

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>WY/sd 030344WO</b>	<b>FOR FURTHER ACTION</b> See Form PCT/IPEA/416																									
International application No. <b>PCT/IB2003/002174</b>	International filing date (day/month/year) <b>10-06-2003</b>	Priority date (day/month/year)																								
International Patent Classification (IPC) or national classification and IPC <b>H04B 1/38, H04B 1/14</b>																										
Applicant <b>Nokia Corporation et al</b>																										
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of <u>5</u> sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"><input checked="" type="checkbox"/></td> <td style="width: 15%;"><b>Box No. I</b></td> <td style="width: 70%;"><b>Basis of the report</b></td> </tr> <tr> <td><input type="checkbox"/></td> <td><b>Box No. II</b></td> <td><b>Priority</b></td> </tr> <tr> <td><input type="checkbox"/></td> <td><b>Box No. III</b></td> <td><b>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</b></td> </tr> <tr> <td><input type="checkbox"/></td> <td><b>Box No. IV</b></td> <td><b>Lack of unity of invention</b></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><b>Box No. V</b></td> <td><b>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</b></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><b>Box No. VI</b></td> <td><b>Certain documents cited</b></td> </tr> <tr> <td><input type="checkbox"/></td> <td><b>Box No. VII</b></td> <td><b>Certain defects in the international application</b></td> </tr> <tr> <td><input type="checkbox"/></td> <td><b>Box No. VIII</b></td> <td><b>Certain observations on the international application</b></td> </tr> </table>			<input checked="" type="checkbox"/>	<b>Box No. I</b>	<b>Basis of the report</b>	<input type="checkbox"/>	<b>Box No. II</b>	<b>Priority</b>	<input type="checkbox"/>	<b>Box No. III</b>	<b>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</b>	<input type="checkbox"/>	<b>Box No. IV</b>	<b>Lack of unity of invention</b>	<input checked="" type="checkbox"/>	<b>Box No. V</b>	<b>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</b>	<input checked="" type="checkbox"/>	<b>Box No. VI</b>	<b>Certain documents cited</b>	<input type="checkbox"/>	<b>Box No. VII</b>	<b>Certain defects in the international application</b>	<input type="checkbox"/>	<b>Box No. VIII</b>	<b>Certain observations on the international application</b>
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Date of submission of the demand <b>23-12-2004</b>	Date of completion of this report <b>10-10-2005</b>
Name and mailing address of the IPEA/SE <b>Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88</b>	Authorized officer <b>Peder Gjervaldsæter /LR Telephone No. +46 8 782 25 00</b>

## Box No. I Basis of the report

1. With regard to the language, this report is based on:

the international application in the language in which it was filed  
 a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of:  
 international search (Rules 12.3(a) and 23.1(b))  
 publication of the international application (Rule 12.4(a))  
 international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

the international application as originally filed/furnished  
 the description:

pages 1 - 30 as originally filed/furnished  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

the claims:

pages \_\_\_\_\_ as originally filed/furnished  
 pages\* \_\_\_\_\_ as amended (together with any statement) under Article 19  
 pages\* 1 - 5 received by this Authority on 2005-10-05  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

the drawings:

pages 1 - 8 as originally filed/furnished  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3.  The amendments have resulted in the cancellation of:

the description, pages \_\_\_\_\_  
 the claims, Nos. \_\_\_\_\_  
 the drawings, sheets/figs \_\_\_\_\_  
 the sequence listing (specify): \_\_\_\_\_  
 any table(s) related to the sequence listing (specify): \_\_\_\_\_

4.  This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

the description, pages \_\_\_\_\_  
 the claims, Nos. \_\_\_\_\_  
 the drawings, sheets/figs \_\_\_\_\_  
 the sequence listing (specify): \_\_\_\_\_  
 any table(s) related to the sequence listing (specify): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

Box No. V      Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims	<u>1-14</u>	YES
	Claims	_____	NO
Inventive step (IS)	Claims	<u>1-14</u>	YES
	Claims	_____	NO
Industrial applicability (IA)	Claims	<u>1-14</u>	YES
	Claims	_____	NO

## 2. Citations and explanations (Rule 70.7)

**The claimed invention**

The claimed invention relates to the problem concerning a GPS receiver combined with GSM/WCDMA transmitter, in which the GPS receiver function is degraded by interference from the GSM/WCDMA transmitter. To avoid this interference the antenna characteristics of the GPS receiver antenna is tuned away from both the GPS frequency and the GSM/WCDMA frequency.

**Prior art**

In the International Search Report the following documents were cited:

D1: EP1079533

D2: Chen et al.: "A dual-L antenna with a novel tuning technique for dual frequency applications"

D3: EP1253720

D4: EP0336418

D1 describes a GPS/GSM multiple standard communication unit. According to D1, characteristics of the antenna can be adapted by shifting it in frequency. By shifting the antenna characteristics in frequency for the receiving subunit (GPS) while the transmitting subunit (GSM) is transmitting the received interference from the transmitting subunit is decreased. (See especially paragraphs 0065, 0095-0097 and claim 14.)

Documents D2-D4 represent the prior art. The claimed invention is not considered to be anticipated by these documents.

..../....

## Supplemental Box

In case the space in any of the preceding boxes is not sufficient.  
Continuation of: BOX V

**Statement of reason**

The invention defined in claims 1-14 is not disclosed by these documents.

These documents fail to show the use of a tunable antenna shifting the frequency response of the antenna combined with two different receiver chains working on different frequency bands.

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed interference reduction in a combined GPS and GSM/WCDMA receiver. Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-14 is novel and is considered to involve an inventive step. The invention is industrially applicable.

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/IB2003/002174

## Box No. VI Certain documents cited

## 1. Certain published documents (Rule 70.10)

Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
US2003/0114188	19/06/2003	18/12/2001	

## 2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure	Date of non-written disclosure (day/month/year)	Date of written disclosure referring to non-written disclosure (day/month/year)

WY/wy 030344WO  
October 5, 2005

05-10-2005

10/559918

C l a i m s  
1AP8 Rec'd PCT/PTO 07 DEC 2005

1. Device (20,40,70) comprising:

- a receiver (21,41,71) comprising at least a first receiving chain (43,73) for receiving and processing radio frequency signals in a first frequency band and a second receiving chain (44,74) for receiving and processing radio frequency signals in a second frequency band;
- at least a first antenna (216,416,716) which is connected to said first receiving chain (43,73) and in addition via a switching component (418,718) to said second receiving chain (44,74);
- a tuning component (217,417,717) for shifting a frequency response of said first antenna (216,416,716) from said first frequency band to a second frequency band; and
- a controlling portion (221,421,721) causing said tuning component (217,417,717) to shift said frequency response of said first antenna (216,416,716) from said first frequency band to said second frequency band and causing said switching component (418,718) to connect said first antenna (416,716) to said second receiving chain (44,74), in case a wideband noise is expected in said first frequency band.

2. Device (20,40,70) according to claim 1, further comprising a communication system transmitter (22,42,72) for transmitting signals via a radio interface, wherein a transmission of signals by said communication system transmitter (22,42,72) causes

05-10-2005

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wideband noise in said first frequency band, and wherein wideband noise in said first frequency band is expected by said controlling portion (221,421,721) whenever said communication system transmitter (22,42,72) is transmitting signals causing wideband noise in said first frequency band.

3. Device (70) according to claim 1, further comprising a second antenna (719), which second antenna (719) has a frequency response at said second frequency band and which second antenna (719) is equally connected via said switching component (718) to said second receiving chain (74), wherein said controlling portion (721) causes said switching component (718) to disconnect said second antenna (719) from said second receiving chain (74), in case a wideband noise is expected in said first frequency band.
4. Device (70) according to claim 3, wherein said controlling portion (721) causes said switching component (718) to connect said first antenna (716) to said second receiving chain (74) and to disconnect said second antenna (719) from said second receiving chain (74), in case a wideband noise is expected in said second frequency band.
5. Device (70) according to claim 4, further comprising a communication system transmitter for transmitting signals via a radio interface, wherein a transmission of signals by said communication system transmitter causes wideband noise in said second frequency band, and wherein wideband noise in said second frequency band is expected by said controlling portion (721) whenever said communication system transmitter is

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transmitting signals causing wideband noise in said second frequency band.

6. Device (20,40,70) according to one of the preceding claims, wherein said receiver (21,41,71) is a Global Positioning System receiver for receiving and processing Global Positioning System signals transmitted by Global Positioning System satellites.
7. Device (40,70) according to claim 6, wherein said first frequency band is a Global Positioning System L1 band and wherein said second frequency band is one of a Global Positioning System L2 band and a Global Positioning System L5 band.
8. Method for improving the performance of a receiver (21,41,71), which receiver (21,41,71) comprises at least a first receiving chain (43,73) for receiving and processing radio frequency signals in a first frequency band and a second receiving chain (44,74) for receiving and processing radio frequency signals in a second frequency band, wherein at least a first antenna (216,416,716) is connected to said first receiving chain (43,73) and in addition via a switching component (418,718) to said second receiving chain (44,74), said method comprising:
  - determining whether a wideband noise is expected in said first frequency band; and
  - shifting a frequency response of said first antenna (216,416,716) from said first frequency band to a second frequency band and causing said switching component (418,718) to connect said first antenna (416,716) to said second receiving chain (44,74), in case a wideband noise is

determined to be expected in said first frequency band.

9. Method according to claim 8, wherein said receiver (21,41,71) is comprised in a single device (20,40,70) with a communication system transmitter (22,42,72), a transmission of signals by said communication system transmitter (22,42,72) causing wideband noise in said first frequency band, and wherein determining whether a wideband noise is expected in said first frequency band comprises detecting whether said communication system transmitter (22,42,72) is transmitting signals via a radio interface.
10. Method according to claim 8, wherein a second antenna (719) is connected to said receiver (71), which second antenna (719) has a frequency response at said second frequency band, said method further comprising preventing a processing of radio frequency signals received via said second antenna (719), in case a wideband noise is determined to be expected in said first frequency band.
11. Method according to claim 10, further comprising:
  - determining whether a wideband noise is expected in said second frequency band;
  - enabling radio frequency signals in said second frequency band received via said first antenna (716) to be processed by said receiver (71), in case a wideband noise is determined to be expected in said second frequency band; and
  - preventing a processing of radio frequency signals received via said second antenna (719) by said receiver (71), in case a wideband noise is

determined to be expected in said second frequency band.

12. Method according to claim 11, wherein said receiver (71) is comprised in a single device (70) with a communication system transmitter, wherein a transmission of signals by said communication system transmitter causes wideband noise in said second frequency band, and wherein determining whether a wideband noise is expected in said second frequency band comprises detecting whether said communication system transmitter is transmitting signals via a radio interface.
13. Method according to one of claims 8 to 12, wherein said receiver (21, 41, 71) is a Global Positioning System receiver for receiving and processing Global Positioning System signals transmitted by Global Positioning System satellites.
14. Method according to claim 13, wherein said first frequency band is a Global Positioning System L1 band and wherein said second frequency band is one of a Global Positioning System L2 band and a Global Positioning System L5 band.